1 Experiment Overview

You are about to participate in an experiment in the economics of decision making. If you listen carefully and make good decisions, you could earn a considerable amount of money that will be paid to you in cash at the end of the experiment.

You have been paired with four other individuals in the room. In each period, each of you will be given an amount of cash, denominated in francs. This will be denoted by the letter E, for "Endowment." Your group will participate in a process in which the level of some good Y will be chosen by the collective decisions of your group members. Each of you has a value for Y that depends on how much Y is chosen by your group. This will be called $V(Y)$. You may not have the same value for a given level of Y as anyone else in your group. Furthermore, your decision in the process may result in you being charged some number of francs T. This number T may be determined by your decision, the decisions of the others in your group, and the level of Y chosen by your group.

At the end of each period, you will be paid for the number of francs you have earned for the period, which is equal to your value for Y plus your initial endowment of francs minus the amount T that you paid. Mathematically, you will be paid based on

$$earnings\ in\ francs = V(Y) + E - T$$

At the end of the experiment, your total earnings in francs will be converted to dollars using a pre-specified exchange rate, which will be told to you by the experimenter.

The rules for the experiment are as follows. No talking or communicating with other participants. If you are using a computer, do not use any software other than that explicitly required by the experiment. Feel free to ask questions by raising your hand or signalling to the experimenter.

The process will now be explained in detail.

2 The Process

All five people in your group value the level of Y by the formula $V(Y) = -CY^2 + DY$. However, people in your group may have different values of C and D. Check your private information slip for your values of C and D. In each period, all players in the group tell the central computer two *non-negative* numbers: A and B. The central computer will assume that each player's value for Y is given by $-AY^2 + BY$ and will then choose the level of Y that maximizes the combined value of all five players. Notice that if everyone submits $A = C$ and $B = D$ to the central computer, then the central computer will maximize the true combined value of all five players. On the other hand, if some players submit $A \neq C$ or $B \neq D$, then the computer will choose a different level of Y.

Since A and B cannot be negative, if you enter negative values into the central computer, it will treat them as zeros.

In addition to choosing the level of Y, the computer will also choose how much each person must pay for the chosen level of Y. In total, every unit of Y costs 100 francs. Thus, the group must pay a *total* of at least $100 * Y$ francs. Each person will pay an equal share of the total cost plus an additional amount depending on the values of A and B chosen by all the members of the group. The additional amount each person must pay is given by the following process used by the computer:

1. Assume that everyone's $V(Y)$ is given by $-AY^2 + BY$ (the computer does *not* know the true C or D for any player.)

2. Calculate the Y that maximizes the sum of the reported values, net of costs. This is given by $Y^* = \frac{(B1+B2+B3+B4+B5)-100}{2*(A1+A2+A3+A4+A5)}$.

3. For each person, calculate the sum of everyone else's value in the group for the amount Y^*, minus $\frac{4}{5} * 100 * Y^*$, which represents how much of the cost of Y^* the other four must pay. Call this amount $U^{-i}(Y^*)$.

4. For each person, calculate the level of Y that maximizes the sum of *everyone else's value*, net of costs. We'll call this value Z^*. For example, for player 2, this is given by $Z^* = \frac{(B1+B3+B4+B5)-100}{2*(A1+A3+A4+A5)}$.

5. For each person, calculate the sum of everyone else's value in the group for the amount Z^*, minus $\frac{4}{5} * 100 * Z^*$, which represents how much of the cost of Z^* the other four must pay. Call this amount $U^{-i}(Z^*)$.

6. Each person must pay $U^{-i}(Z^*) - U^{-i}(Y^*)$.

In words, each person must pay the difference between everyone else's value if that person weren't playing the game $\left(U^{-i}(Z^*)\right)$ and everyone else's value if that person was playing the game $\left(U^{-i}(Y^*)\right)$. This payment can be summarized by the phrase, "you must pay the change in everyone else's value that occurred because of your presence." Remember that the computer makes the above calculation based on the values of A and B that are reported and *not* on the actual values C and D.

In total, the amount each person must pay is $T = \frac{100*Y}{5} + \left[U^{-i}(Z^*) - U^{-i}(Y^*)\right]$. This process is guaranteed to collect at least enough money to cover the cost of Y. However, it is often the case that it collects more money than is needed to cover the cost of Y. If an excess is collected, the extra money is not refunded or used in any way.

At the end of the period, you receive your value for the level of Y chosen (which is $-CY^2 + DY$) plus E minus T.

This process is computerized. In each period, you will input your decision into a computer program that will calculate Y and determine your payment and your earnings based on the decisions of your group. The computer will

also keep track of your earnings and the results of all previous periods for your reference. The computer interface includes a tool called the "What-If Scenario Analyzer". This is a special calculator adapted to help you figure out how much you would earn in certain hypothetical scenarios. Feel free to use this tool to help you make decisions. If you have any questions about the computer interface at any time, please raise your hand.

Questions?